

THAT WHICH IS CLAIMED IS:

1. A method for the preparation of a 1-benzotriazolylcarbonate ester of a water-soluble and non-peptidic polymer, comprising:

5 providing a water-soluble and non-peptidic polymer having at least one terminal hydroxyl group; and

reacting the terminal hydroxyl group of the water-soluble and non-peptidic polymer with di(1-benzotriazolyl)carbonate to form a 1-benzotriazolylcarbonate ester of the water-soluble and non-peptidic polymer.

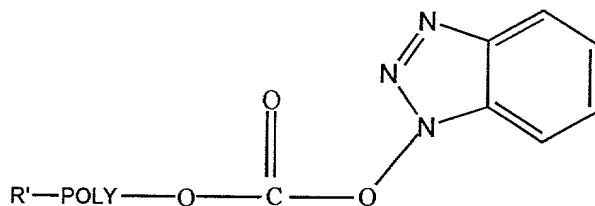
10 2. The method of Claim 1, wherein the water-soluble and non-peptidic polymer is selected from the group consisting of poly(alkylene glycol), poly(oxyethylated polyol), poly(olefinic alcohol), poly(vinylpyrrolidone), poly(hydroxypropylmethacrylamide), poly( $\alpha$ -hydroxy acid), poly(vinyl alcohol),  
15 polyphosphazene, polyoxazoline, poly(N-acryloylmorpholine), and copolymers, terpolymers, and mixtures thereof.

20 3. The method of Claim 1, wherein the water-soluble and non-peptidic polymer is poly(ethylene glycol).

4. The method of Claim 3, wherein the poly(ethylene glycol) has an average molecular weight from about 200 Da to about 100,000 Da.

25 5. The method of Claim 1, wherein the water-soluble and non-peptidic polymer has from about 2 to about 300 termini.

6. The method of Claim 1, wherein the water-soluble and non-peptidic polymer has the structure R'-POLY-OH and the 1-benzotriazolylcarbonate ester of the water-soluble and non-peptidic polymer has the structure



wherein POLY is a water-soluble and non-peptidic polymer backbone and R' is a capping group.

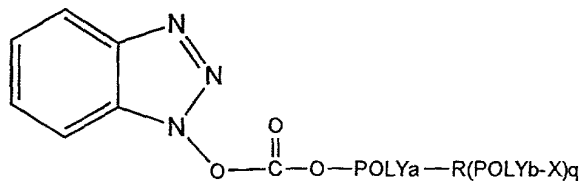
7. The method of Claim 6, wherein POLY is poly(ethylene glycol).

8. The method of Claim 7, wherein the poly(ethylene glycol) has an average molecular weight from about 200 Da to about 100,000 Da.

9. The method of Claim 6, wherein R' is methoxy.

10. The method of Claim 6, wherein R' is a functional group selected from the group consisting of hydroxyl, protected hydroxyl, active ester, active carbonate, acetal, aldehyde, aldehyde hydrates, alkenyl, acrylate, methacrylate, acrylamide, active sulfone, protected amine, protected hydrazide, thiol, protected thiol, carboxylic acid, protected carboxylic acid, isocyanate, isothiocyanate, maleimide, vinylsulfone, dithiopyridine, vinylpyridine, iodoacetamide, epoxide, glyoxals, diones, mesylates, tosylates, and tresylate.

11. The method of Claim 1, wherein the water-soluble and non-peptidic polymer has the structure HO-POLYa-R(POLYb-X)<sub>q</sub> and the 1-benzotriazolylcarbonate ester of the water-soluble and non-peptidic polymer has the structure



5                    wherein POLYa and POLYb are water-soluble and non-peptidic polymer backbones that may be the same or different;

                  R is a central core molecule;

                  q is an integer from 2 to about 300; and

                  each X is a capping group.

10                    12. The method of Claim 11, wherein POLYa and POLYb are poly(ethylene glycol).

15                    13. The method of Claim 12, wherein POLYa and POLYb each have an average molecular weight from about 200 Da to about 100,000 Da.

20                    14. The method of Claim 11, wherein each X is independently selected from the group consisting of alkoxy, hydroxyl, protected hydroxyl, active ester, active carbonate, acetal, aldehyde, aldehyde hydrates, alkenyl, acrylate, methacrylate, acrylamide, active sulfone, protected amine, protected hydrazide, thiol, protected thiol, carboxylic acid, protected carboxylic acid, isocyanate, isothiocyanate, maleimide, vinylsulfone, dithiopyridine, vinylpyridine, iodoacetamide, epoxide, glyoxals, diones, mesylates, tosylates, and tresylate.

25                    15. The method of Claim 1, wherein said reacting step is conducted in an organic solvent.

16. The method of Claim 15, wherein the organic solvent is selected from the group consisting of methylene chloride, chloroform, acetonitrile, tetrahydrofuran, dimethylformamide, dimethyl sulfoxide, and mixtures thereof.

5           17. The method of Claim 1, wherein said reacting step is conducted in the presence of a base.

18. The method of Claim 17, wherein the base is selected from the group consisting of pyridine, dimethylaminopyridine, quinoline, trialkylamines, and mixtures thereof.

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19. The method of Claim 1, wherein the molar ratio of di(1-benzotriazolyl) carbonate to the water-soluble and non-peptidic polymer is about 30:1 or less.

15           20. The method of Claim 1, further comprising the steps of:  
              providing a second polymer having a plurality of primary amino groups;  
              and  
              reacting the 1-benzotriazolylcarbonate ester of the water-soluble and non-peptidic polymer with at least two of the amino groups of the second polymer to form a cross-linked polymer.

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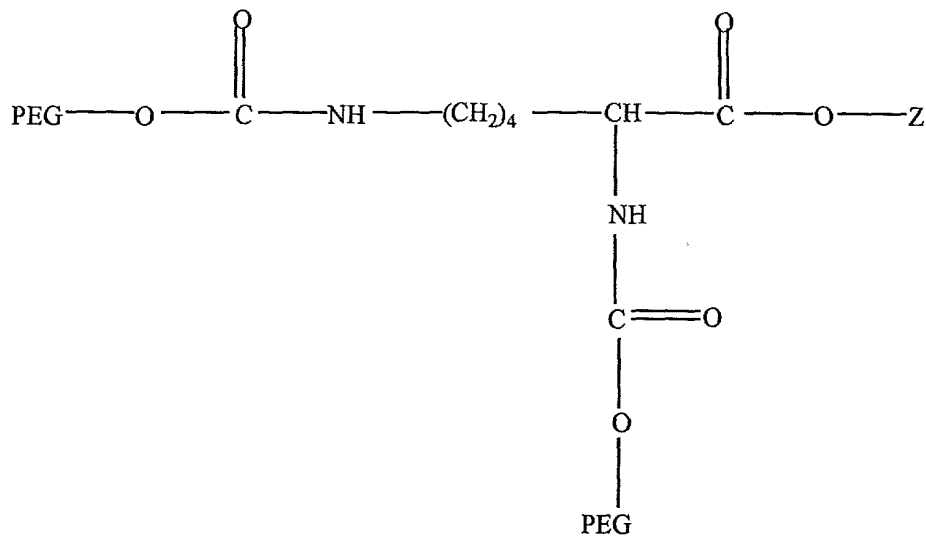
21. The method of Claim 20, wherein the second polymer is selected from the group consisting of proteins, aminopoly(ethylene glycol), aminocarbohydrates, and poly(vinylamine).

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22. The method of Claim 1, further comprising the step of reacting the 1-benzotriazolylcarbonate ester of the water-soluble and non-peptidic polymer with an amino acid to form an amino acid derivative.

30           23. The method of Claim 22, wherein the amino acid is lysine.

24. The method of Claim 23, wherein the amino acid derivative has the structure



wherein PEG is poly(ethylene glycol) and Z is selected from the group consisting of H, N-succinimidyl, or 1-benzotriazolyl.

25. The method of Claim 1, further comprising the step of reacting the 1-benzotriazolylcarbonate ester of the water-soluble and non-peptidic polymer with a biologically active agent to form a biologically active polymer conjugate.

26. The method of Claim 25, wherein the biologically active agent is selected from the group consisting of peptides, proteins, enzymes, small molecule drugs, dyes, lipids, nucleosides, oligonucleotides, cells, viruses, liposomes, microparticles and micelles.

27. A 1-benzotriazolylcarbonate ester of a water-soluble and non-peptidic polymer prepared according to the process of Claim 1.

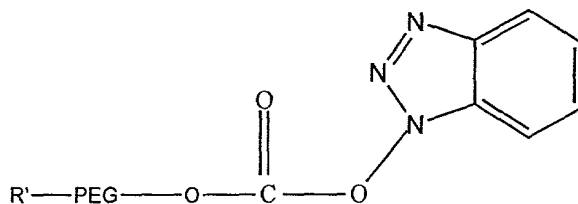
28. A method for the preparation of a 1-benzotriazolylcarbonate ester of a water-soluble and non-peptidic polymer, comprising:

providing a poly(ethylene glycol) molecule with a terminal hydroxyl group and an average molecular weight from about 200 Da to about 100,000 Da and having the structure



wherein R' is a capping group; and

reacting the terminal hydroxyl group with di(1-benzotriazolyl)carbonate to form a 1-benzotriazolylcarbonate ester of the poly(ethylene glycol) having the structure



wherein R' is as defined above.

29. The method of Claim 28, wherein R' is methoxy.

30. The method of Claim 28, wherein R' is a functional group selected from the group consisting of hydroxyl, protected hydroxyl, active ester, active carbonate, acetal, aldehyde, aldehyde hydrates, alkenyl, acrylate, methacrylate, acrylamide, active sulfone, protected amine, protected hydrazide, thiol, protected thiol, carboxylic acid, protected carboxylic acid, isocyanate, isothiocyanate, maleimide, vinylsulfone, dithiopyridine, vinylpyridine, iodoacetamide, epoxide, glyoxals, diones, mesylates, tosylates, and tresylate.